

Luxembourg: Invested in innovation

A vibrant research and innovation ecosystem drives the economy forward

Located at the heart of Europe, Luxembourg has become one of the European Union's strongest innovators and boasts its most attractive research systems, according to the bloc's Innovation Scorecard 2021.

Probably best known for its hugely influential financial services sector, in 2000 the small, wealthy country set out to diversify its economy into additional innovative industries by establishing a university and initiating one of Europe's fastest-growing public-research budgets, says Claude Meisch, Minister for Higher Education and Research. "We've come extremely far: we've built the highly acclaimed University of Luxembourg and have invested a great deal in research and innovation (R&I), which will continue. Today, like our economy, our research and higher education sector is dynamic and international."

As a result of its efforts, Luxembourg has created a vibrant public-sector R&I ecosystem that is based around the research-intensive university, internationally renowned research institutes and extraordinary infrastructure, such as a supercomputer that is among the most powerful in Europe. Already, this ecosystem has helped the country to become a global leader in various sectors that include novel materials, biomedicine, space, educational sciences and information technology, particularly in terms of fintech, security and communication.

A key characteristic of the ecosystem is its capacity for cooperation and coordination—for example, major public-sector R&I players, including their main funding body, Luxembourg National Research Fund, work together

"Like our economy, our research and higher education sector is dynamic and international."

Claude Meisch, Minister for Higher Education and Research

through a joint initiative, Research Luxembourg. As Meisch points out, "This isn't an isolated world of laboratories. Luxembourg is the ideal environment for innovative companies: as a small country, the proximity to decision makers makes it easy to set up ventures and find partners. We encourage public-private collaboration and integrate the objectives of the private sector into our R&I planning." It's also a fruitful environment for entrepreneurs and various public bodies offer support services for startups. Leading businesses are fostering the next-generation of talent as well, with a prominent example being Paul Wurth, the global frontrunner in iron and steel, which runs an incubator for industrial technologies. "We now have a really attractive entrepreneurial ecosystem and a startup community that is tremendously international," Meisch reveals.

Despite expanding into new innovative areas, the lynchpin of an economy that recorded a 7-percent increase in gross domestic product last year is still a



Per capita, Luxembourg is the world's second-wealthiest country

financial services sector which is the largest in the EU. "The banking industry directly contributes over a third of the economy and was one of its biggest supporters during the crisis," says Guy Hoffmann, chairman of the Luxembourg Bankers' Association. "Our financial sector as a whole is robust and we have all the main actors here, including the banks, insurance companies, funds, private-equity firms and legal specialists." Luxembourg was the first in Europe to adopt a framework for sustainable bonds and Hoffmann believes that, with its network of leading players working alongside its agile authorities, the nation can be a hub for sustainable finance.

It's always been a financial innovator, most notably in cross-border funds. "Luxembourg is now the world's second-largest fund center and many pan-European funds and management companies are based here," states Stéphane Pesch, CEO of Luxembourg Private Equity and Venture Capital Association. The trade body's members have embraced digitalization and fintech, he says. "We enjoy collaborating with the many different incubators, accelerators and practitioners here. We also enjoy constant communication with authorities and ministers that enables us to maintain Luxembourg as a great platform."

As well as being the EU's hub for finance, the strategically located nation has positioned itself as its logistics gateway. "It's easy to bring goods in and redistribute them to the rest of Europe. Another advantage is the multiplicity of languages spoken here," explains Benny Mantin, director of Luxembourg Centre for Logistics and Supply Chain Management, a cutting-edge research and education center at the university. Also important is an advanced multi-modal transport system covering road, rail and an airport that is home to Car-golux, Europe's largest cargo airline, and award-winning passenger-and-freight airline Luxair. Mantin is enthusiastic about what Luxembourg offers businesses in all sectors. "There are great opportunities to leverage and, with the right ambitions, you can always succeed here."

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The European hub for research and innovation

Close collaboration between the main public-sector players has helped put Luxembourg's well-funded research on the global map

Backed by one of Europe's fastest-growing public-research budgets, Luxembourg has established an internationally competitive research and innovation (R&I) ecosystem in just two decades.

According to Claude Meisch, Minister for Higher Education and Research, "Currently, we invest 0.8 percent of our gross domestic product in public research. We want to increase this to 1 percent and are increasing our budgets every year to achieve this." To provide a focus for the evolution of its R&I ecosystem, in 2020 the government launched a new research and innovation strategy that defines how its investment will be targeted over the next 10 years, he states. "There are four key areas: personalized medicine, sustainable and responsible development, industrial and service transformation and 21st-century education." Central to the strategy's design and implementation are the organizations that make up Research Luxembourg, a joint initiative that includes the major public-sector R&I players: Luxembourg National Research Fund (FNR), Luxinnovation, the University of Luxembourg, Luxembourg Institute of Socio-Economic Research (LISER), Luxembourg Institute of Health (LIH) and Luxembourg Institute of Science and Technology (LIST).

"Through our team effort, we've put Luxembourgish R&I on the map," says Marc Schiltz, CEO of FNR, the main funder of research in the country. In line with the national strategy, much of FNR's investment is going to niche areas in which the country has become a global specialist, he reveals. "For example, we're strong in novel materials including composites, we're exceptionally good in systems biomedicine, we're in a unique situation for educational sciences because Luxembourg is extraordinarily international, and funding the space sector is also a niche. Another pillar is information technology, particularly the security and communication aspects." To build on this strength in digitalization, the country has acquired one of Europe's most powerful supercomputers, MeluXina. "Developing the right

infrastructure for R&I sends a message that the world has noticed. Researchers, startups and other businesses sense Luxembourg's willingness to carry on with these advancements—they know they will be supported here," asserts Schiltz.

FNR's funding is aimed mostly at the country's university and research institutes. However, it also supports research in companies through student and post-doctoral grants, and the strong promotion of public-private collaborations, he notes. "Public research can be the engine of an R&I train that industries and companies can hop on to. In addition, FNR has made an enormous effort to create international networks, which may be our forte. We've been increasing our share in the European Union's framework programs and the number of international collaboration projects that we fund is increasing, which is an excellent sign."

Another body supporting the private sector is Luxinnovation, whose programs include support for digitalization, a digital innovation hub and various services for local and international startups, larger businesses and investors, empowering them to innovate today to be ready for tomorrow. "Luxinnovation also acts as a bridge between companies and research capacities in Luxembourg and beyond. Linking startups with the many larger industry players that are based in Luxembourg is important as well," says its CEO, Sasha Baillie. Collaboration with industry is a



Claude Meisch
Minister for Higher Education and Research

"Public research can be the engine of a research and innovation train that industries and companies can hop on to."

Marc Schiltz, CEO, Luxembourg National Research Fund

renowned characteristic of the research-intensive University of Luxembourg as well, states its rector, Stéphane Pallage. "We interact with the private sector worldwide through, for example, our interdisciplinary research centers that include the Luxembourg Centre for Systems Biomedicine and the Interdisciplinary Centre for Security, Reliability and Trust, which covers cybersecurity, artificial intelligence and space-related topics. We also involve the private sector in shaping our academic programs."

"What makes Luxembourg different is a capacity to coordinate, talk collectively and work in an inter-sectorial and interdisciplinary way," notes Aline Muller, CEO of LISER, which undertakes research with a dual scientific and societal mission. "For instance, we are working on a national digital twin: a digital mirror of Luxembourg. From a social science perspective, it's revolutionary." The benefits of this collaborative approach are confirmed by Ulf Nehrbass, CEO of LIH, that has particular strengths in oncology, immunology, neurodegeneration and digital health. "In digital health, Luxembourg can devise solutions that incorporate all the country's stakeholders—be they hospitals, patients, the centralized health insurance system, the ministries or the research institutes. For me, the most exuberant, dynamic and can-do place in the world right now is Luxembourg." Thomas Kallstenius, CEO of LIST, which takes an interdisciplinary, impact-driven approach to research focused on space technologies, informatics, environmental science and materials, agrees. "Our innovation ecosystem is incredibly vibrant and efficient. Luxembourg, as a living lab, is small enough to function as the perfect testbed in Europe, research is well funded, we have outstanding people, extraordinary infrastructure and an excellent partner ecosystem. Luxembourg is one of the greatest innovation hubs in Europe."

Research Luxembourg in numbers

- Luxembourg is increasing research funding to a total of **€1.7bn** for the 2022–2025 period, up **17.6%** on the previous years
- **Four research priority areas:**
Industrial and service transformation
Sustainable and responsible development
Personalized healthcare
21st-century education
- Funding commitments by the Luxembourg National Research Fund (FNR) of **€97m** in 2020

Driving the sustainability of financial services

Luxembourg's financial sector provides a great illustration of how the country's research institutions, startups and established businesses work together to innovate

"The primary task of the financial industry is to help stimulate economic activity. But now the sector has an added responsibility, which is to help build a better, more open and more equitable global economy from an environmental, social and diversity standpoint," says Nicolas Mackel, CEO of Luxembourg for Finance, the public-private agency tasked with developing the country's financial services industry.

With assets of €5.3 trillion under management in Luxembourg, it is home to the European Union's largest financial sector, which is making a major contribution toward this goal through research and innovation, he asserts. "The main objective isn't to create a parallel market for sustainable finance products, it's to ensure that the finance that everyone engages in is sustainable." Technology plays a profoundly important role in this, Mackel adds. "It creates

better information to understand what is sustainable and it helps deliver better services. Everything around digitalization from tokenization to central bank digital currencies to artificial intelligence are themes that will keep us terribly busy over the next couple of years."

The country's university and research institutes like Luxembourg Institute of Science and Technology and the Interdisciplinary Centre for Security, Reliability and Trust work hand in hand with the financial sector on innovation, supported by the government's constant investment in infrastructure, such as the new supercomputer MeluXina. "It's a great incentive for local firms and I'm looking forward to seeing what researchers and others will develop from it," says Nasir Zubairi, CEO of Luxembourg House of Financial Technology, a public-private innovation hub for fintech that, among other things, provides co-working space and incubator services for startups and promotes partnerships between emerging innovators and larger corporates in the financial sector.

The country is an extremely attractive destination for fintech startups, Mackel notes. "If you are developing regulatory reporting, risk management or wealth management tools, for instance, you have a vast pool of potential clients here. And there is an entire ecosystem around payments, with companies like PayPal, Amazon Pay, Alipay and Airbnb operating out of Luxembourg. Part of our activity is to bring startups here, not least to provide our established players with access to tools that allow them to transition into the digital era."

According to Zubairi, "In Luxembourg, we can bring together all the elements: traditional financial services, government, researchers, tech firms, investors and regulators. Luxembourg is quite unique in being able to do this because it is small, yet incredibly powerful in financial services. The sharpness and the community spirit within the country is characterized by everyone believing that we can make a difference—it's incredibly motivating."



R&D excellence is a national priority

Industry leaders based in Luxembourg are fostering the development of its research and innovation ecosystem

“Luxembourg’s biggest advantage for somebody with a company or entrepreneurial ideas is that it is small. There is close proximity to decision makers and it’s easy to find a partner to get support for your endeavor. Our ecosystem creates the ideal environment for research and innovation,” states Claude Meisch, Minister for Higher Education and Research.

A key participant in that ecosystem is Paul Wurth, a worldwide frontrunner in the iron and steel industry. Headquartered in Luxembourg since it was founded in 1870, Paul Wurth is a leader in the design and construction of blast-furnace, coke-oven and direct-reduction plants, as well as environmental protection technologies, waste treatment, recycling and a full range of services for the sector. The group has always been an innovator, says its CEO, Georges Rassel. “45 years ago, for example, we revolutionized the sector with blast-furnace processes that were far more efficient and had a substantial effect

MISSION POSSIBLE

At Paul Wurth, it is our mission to transform the global iron and steel industry.

We choose to accept it.

PAUL WURTH SMS group



Paul Wurth celebrated its 150th anniversary in 2020

on conservation of fossil fuels. That put Paul Wurth and Luxembourg on the map among the leaders in the industry.”

In recent years, the group has redirected its focus toward developing innovative green and carbon-dioxide-reducing technologies that will enable the decarbonization of the metals industry, such as the use of hydrogen to produce green steel. Recognized for setting the standards in this area, Paul Wurth’s Luxembourg base is being expanded to become a global research and development center for its parent, SMS group, which operates across the whole metals industry process chain. As well as counting on its in-house experts to generate the sector’s greener future, Paul Wurth collaborates with others, including the University of Luxembourg, where it has established a chair for energy process engineering, says Rassel. “We are developing the competences that are needed as we switch to hydrogen-based and other technical solutions.”

The group also has its own incubator in Luxembourg, Paul Wurth InCub, which fosters entrepreneurs working in industrial technologies and is an integral part of the country’s startup system, Rassel explains. “We can help them develop their technology or, on the commercial side, we can help with our worldwide sourcing networks, project management and project realization. Most of our successes to date are related to digital solutions that are somehow linked to our industry, where we can put them into relationships with customers and subcontract part of our development work to them, counting on their creativity and willingness to produce results.”

“We are developing the competences that are needed as we switch to hydrogen-based and other technical solutions.”

Georges Rassel, CEO, Paul Wurth

Startups currently hosted at InCub are working in areas including robotics, 3D printing, the Internet of Things, sensors, virtual reality and machine learning. To illustrate their innovative ambitions, he highlights ispace, which is developing micro-robotic lunar rovers and landers. “We learned of its aspiration to mine in space, thought we could combine our processes with its targets and, once it’s on the moon or an asteroid, we could try to help it extract metals.” Paul Wurth is also contributing to Luxembourg’s innovation ecosystem by investing directly in some of the startups it nurtures. An example is DataThings, which creates intelligent software systems that transform data from a range of sectors into actionable insights, he reveals. “It’s a good fit with our activities. We wanted to bring additional money into the company to allow it to grow and be even more efficient at developing solutions that our customers need.”

Focused on sustainable technologies

Georges Rassel, CEO, Paul Wurth, reveals how the global frontrunner in iron and steel is contributing to solving the climate-change challenge



Georges Rassel, CEO, Paul Wurth

The iron and steel industry accounts for up to 7 percent of global carbon-dioxide emissions. Is climate change the biggest challenge facing the global iron and steel industry today?

Both our industry and, I would say, the entire planet share a common challenge, which is finding solutions for climate change, such as reducing greenhouse gas emissions and, in our case, producing green steel. This is a colossal challenge for the industry and solutions range anywhere from increasing renewable power sources, to creating massive electrolyzers to produce hydrogen, to financing new green-hydrogen-based production plants to replace carbon-based facilities. There is still a great need for steel in a decarbonizing world—wind-power towers, for instance, are made of steel. But green steel can be 100-percent recycled many times and will have a significant place in the carbon-free future.

Developing hydrogen technologies is one of the ways Paul Wurth is aiming to drive the decarbonization of iron and steel. Outside of its core industry, it is also participating in, for instance, the Norsk e-Fuel consortium to develop Europe’s first commercial plant for hydrogen-based renewable aviation fuel, as well as in the European Union’s MultiPLHY project to build the world’s first green-hydrogen plant for a biofuel refinery. Why are you pursuing these projects?

If the iron and steel industry really wanted to, it would be technically possible to replace coal with hydrogen, although the quantities necessary are truly huge. Part of our strategy is to get involved in green-hydrogen production and its use in various industries, with an emphasis on the metal sector. To fully understand the technical aspects before we could venture into specific applications, we invested in the cleantech company Sunfire, which produces innovative electrolyzers and fuel cells. We have now got to the point where we are driving the applications of this technology and customers are listening

to us, as we have proven that we have done our homework and are extremely knowledgeable in this area.

Transportation is just one example of many activities that are being electrified. The amount of green electricity needed will grow very quickly and not all countries in the world have the same advantages in renewable sources such as solar, wind and hydro power. Luxembourg, for instance, would never produce enough renewable energy to cover its demand for green electricity.

Luxembourg is rated third globally in the IMD World Talent Ranking. What are some other advantages it has as a base for innovative businesses?

Luxembourg is geographically positioned well from a strategic point of view. It’s easy to source things that are typically needed for developing industries, especially when it comes to young startups that need support at the beginning of their journeys, and it’s easy to get to know many people quickly.

“Green steel can be 100-percent recycled many times and will have a significant place in the carbon-free future.”

Georges Rassel, CEO, Paul Wurth

In addition, there is a disposition to creating an innovation ecosystem here, together with the university and research centers. Also, the country’s purchase of the MeluXina supercomputer is clear proof that Luxembourg is on the cutting-edge of innovation. We are able to use it for simulations that we had previously been struggling with, which means that things that took a few weeks to do are now reduced to a few hours of calculation time. This will allow Paul Wurth to do many more simulations and get results quicker, which is crucial if we want to be at the fore of the newest developments.

Paul Wurth: Shaping the future

- Green steel:** Leading the transition toward carbon-free steel production
- Stepwise CO₂ reduction:** Reducing the carbon footprint of hot metal production
- Power-to-X:** Renewable synthetic fuels that help decarbonize transportation
- Digital solutions:** Paving the way for self-learning production plants

Banking leader is a key contributor to economic growth

Luxembourg's Spuerkeess is taking a transition-enabler approach to creating sustainable economic development in the country

Consistently rated the best universal bank in Luxembourg by customers and sector experts, Spuerkeess has been supporting the country's individuals, businesses and public sector with a comprehensive range of banking and financial products and services for over 160 years.

The market leader serves a vital role in Luxembourg, says CEO Françoise Thoma. "Spuerkeess is a central player in the economic ecosystem. As a public-owned bank, we have a mission to contribute to the economic and social development of the country." This mission is evident throughout its activities: for instance, it has strict socially responsible lending policies, is a key shareholder in priority economic areas and is one of the country's biggest employers.

A signatory to the UN Principles for Responsible Banking, Spuerkeess has a transition-enabler approach to environmental, social and governance issues (ESG), particularly climate change, states Thoma. "Our role is to accom-

pany our customers in this transition journey, especially small and medium-sized businesses. Among many other measures, we've established a one-stop shop to inform customers about supports for ESG projects, we've enhanced the ESG orientation of our investment portfolios, and we've created a unique scientific advisory board to translate ESG concepts into concrete measures and products around climate and nature-related risk management."

Spuerkeess is also contributing to Luxembourg's digitalization by funding its clients' digital projects, and by ensuring that its own systems and channels of communication optimize their use of digital technologies—the bank has been operating its online S-Net banking service for 20 years and has added a mobile branch, Spuerkeess Direct, to its extensive physical network. Rated AA+ by Standard & Poor's and Aa2 by Moody's, Spuerkeess is regarded as one of the world's safest and most stable banks, partly due to its conservative risk profile. However, Thoma stresses, "We invest in many projects involving new technologies, such as fintech, artificial intelligence and space activities. Part of our role in Luxembourg is to take some industrial risk in new sectors of the economy. We avoid financial and compliance risk—we don't avoid entrepreneurial risk."

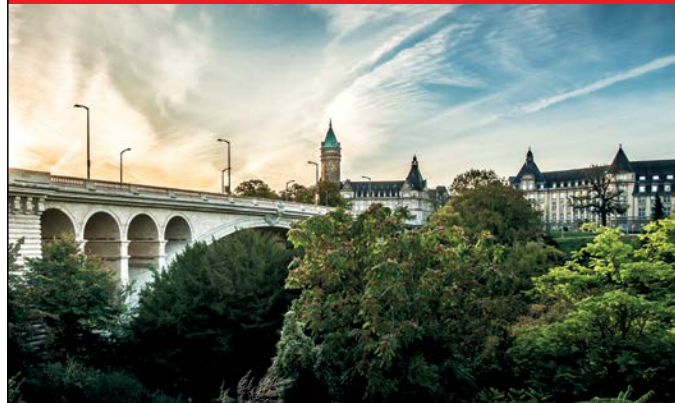


Françoise Thoma
CEO, Spuerkeess

"We avoid financial and compliance risk—we don't avoid entrepreneurial risk."

Françoise Thoma, CEO, Spuerkeess

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Not only is Spuerkeess the oldest financial institution in Luxembourg and one of the safest and highest rated banks worldwide, it is also highly appraised by its customers, ranking it number 1 brand in the 2021 KPMG Luxembourg Global Customer Experience Excellence report.

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Expert partners in smart legal services

The leading business law firm, Elvinger Hoss Prussen, opens up financial and commercial opportunities in Luxembourg for foreign investors

Since 1964, Elvinger Hoss Prussen has provided worldwide clients that include corporations, financial institutions and entrepreneurs with a full range of expert legal services based around four core practice groups: asset management and investment funds; corporate, banking and finance; dispute resolution and commercial; and tax.

Our firm is independent and only provides advice relating to Luxembourg, explains Joachim Cour, partner and one of over 400 members of the law firm. "Very few other firms in Luxembourg have the scale to absorb the volume of work and knowledge that is necessary to advise clients in all areas of their business." In addition to its Luxembourg headquarters, it has teams of partners that operate from offices in New York, in association with Elvinger S.à r.l. PLLC, and Hong Kong. "These provide the same quality of advice, but are closer to clients for whom time-zone alignment is important," he says. As a result of its independence, the firm is also able to form cross-border relationships with its peers across the world to suit any case.

Luxembourg's stability and a multicultural reality that is reflected in the firm make it an excellent European base for enterprises and investors, Cour



Joachim Cour
Partner
Elvinger Hoss Prussen



Virginie Lebbe
New Regulations and Knowledge Development
Elvinger Hoss Prussen

asserts. The fact that Luxembourg is at the forefront of environmental, social and governance (ESG) issues is another key advantage, adds Virginie Lebbe, new regulations and knowledge development. "The biggest challenge for the next years facing asset managers, for instance, will be to choose the right path for their ESG strategy, to be transparent about it and to be able to evidence it. With its long experience in implementing European Union (EU) asset-management legislation and developing ESG activities, Luxembourg is well placed to help the asset-management industry."

While most of its financial law is driven by the EU, Luxembourg always aims to add value, notes Cour. "We try to have a toolbox that satisfies all cultures. For example, when we implemented the EU's Alternative Investment Fund Managers Directive, we also introduced a partnership vehicle inspired by Anglo-Saxon law. It was the first time that U.S. and other asset managers could find an investment tool in continental Europe that is extremely similar to what they are accustomed to. That's just one translation of Luxembourg's positive and smart approach to legislation."

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Luxembourg boasts the world's second-largest fund industry after the U.S., with 75 countries accepting its cross-Europe mutual fund products.

"It's an important jurisdiction for well-managed, well-regulated and well-respected investment products, initially based on tradable securities and more recently it has become a massive center for alternative investments," states Jervis Smith, country managing director for Luxembourg at Vistra, the leading global fund administrator and corporate service provider. "All together, Vistra has around 5,000 colleagues in 46 countries, a fund administration of nearly \$400 billion and we manage over 200,000 entities worldwide, including about 20 percent of the Fortune Global 500 and two-thirds of the top private equity firms. Our business is defined around the client segments that we serve: private equity, real estate, corporate business, private wealth and capital markets, which is effectively the administration of securitization vehicles," says Smith.

Vistra is at the forefront of Luxembourg's alternative investment sector, especially in relation to private equity and maximizing the advantages of new real estate funds that offer diversification for investors, he reveals. "There is a need for service providers like us that supply all the administrative support around those investments. It's a 'high-touch' environment that is moving toward a 'high-tech' environment, where we provide fund administration, but also administer the special purpose vehicles that are launched every time clients make an investment. Important ingredients in our success are our global presence, local knowledge and expertise in end-to-end service."



Jervis Smith
Country Managing Director, Vistra Luxembourg

Those ingredients have also made Vistra a major force in services for firms wanting to expand internationally from or to Luxembourg, Smith adds. "Our clients rely on us to take care of their commitments and interests, so that they can expand with courage and expertise." To better serve its clients, Vistra itself has grown substantially, with U.S.-based international expansion services firm Radius being among recent acquisitions. In Luxembourg, however, growth has been organic. "All our business segments are flourishing, particularly on the fund side, which is growing at double-digit rates and we are gaining market share," he asserts, adding that one driver of this is the country's preeminence in environmental, social and governance (ESG) issues. "50 percent of the world's green bonds are traded on the Luxembourg stock exchange and I see ESG as a growth area for Luxembourg going forward. I'm jurisdiction neutral, but there is a lot of attraction here for people who want to do international business."

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A culture of nurturing talent to boost innovation

Riccardo Lamanna, Senior Vice President and Country Head, State Street, describes Luxembourg's strengths in investment services



State Street ranks number one for assets served in Luxembourg

Part of one of the preeminent global providers of financial services for institutional investors, what makes State Street in Luxembourg stand out?

State Street in Luxembourg ranks number one in terms of assets served; we serve roughly \$1.5 trillion of assets across custody services, depository bank, fund administration, our Transfer Agency services and ancillary products. Many of State Street's clients have large operations here, as Luxembourg is considered the hub for manufacturing the most complex products and the building blocks of investment strategies that our clients deliver to their clients. We help them distribute their products in 26 countries around the globe from here and State Street's acquisition of Brown Brothers Harriman will give us access to additional markets and consolidate our position as a leading provider.

Our success has been determined by many factors, including the talent, skills, dedication and commitment of our people. We invest in continuous training and mentoring, and have developed expertise and skills to anticipate the need of the market and cope with all our clients' needs. We aim to be an attractive place for local and expat talents that can give us the boost to innovate. We offer a very diverse and inclusive environment where staff can develop and deliver an entrepreneurial approach and take risk in a well-structured environment. And our employees have never hesitated to give back and help our communities through our active inclusion, diversity and equity networks.

As well as good people, we have developed thanks to a long-term strategy, strong innovation culture, significant relationships, the ability to serve large, medium and small clients with high-quality service, and a breadth of product that is unmatched. Our growth here has been nurtured by developments of global products in middle and front office, trading platforms, market services and, most recently, our digital division that is focused on digital asset products and services. Another important point is that risk management, respect and inclusion at State Street are very strong. These cultural traits, plus our technology, resilience, structure and processes helped us maintain a sound level of operations during the pandemic.

How is State Street investing in digital innovation?

One can't underestimate the need for infrastructure that ensures integrity and integration of data, as well as the ability to apply innovative services, functions and models. State Street processes roughly 15 percent of the world's savings and has access to a massive amount of data. We need to reassure clients that we can protect this and use it correctly. This is one of the areas where we have invested the most and we're swiftly moving into cloud technologies. In terms of integration, the issue is to ensure that data can be transformed into well-processed, properly structured information.

What is Luxembourg's appeal for investors?

Luxembourg has a long history of supporting asset managers, plus the skills to serve different asset classes. We continue to leverage on traditional asset management, but are quickly developing strong alternatives. In particular, we are seeing growth in clients choosing Luxembourg to set up vehicles for investments in private equity, real estate and loans, and we see a great deal of client interest around its ability to deliver on digital assets. Luxembourg continues to invest and to be an excellent place to do business.



Riccardo Lamanna
Senior Vice President and Country Head, State Street

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Next-generation logistics and supply chains

The Luxembourg Centre for Logistics and Supply Chain Management (LCL) punches above its weight in research and education

Many multinationals are now choosing Luxembourg as a logistics and procurement base due to its strategic European location, multilingual capabilities and multimodal transport network.

Another major asset is LCL, a young center at the University of Luxembourg that punches above its weight in cutting-edge logistics and supply chain academic programs and research. “LCL was established in 2015 in an agreement between the government, the university and Massachusetts Institute of Technology (MIT),” says Benny Mantin, LCL’s director. Since then, it has grown substantially, not least in its research capacity, with an increasing number of PhD students, post-doctoral and expert scientists now generating research with an international reputation. The strength of their expertise has been demonstrated during the pandemic, with LCL taking the lead in the national COVID-19 TaskForce’s working group for logistics and supply chains, whose advice to industry and government has proved crucial.

LCL’s flagship education program is a Logistics and Supply Chain Master that will see its fifth cohort of graduates in 2022, notes Mantin. “As a member of the MIT Global SCALE network, our one-year master’s follows MIT’s template and attracts students from all over the world. They normally come from



Benny Mantin
Director, LCL



2021-22 class at LCL’s annual Young Logistics Professionals event

backgrounds such as economics, engineering or management, and will have spent time in the logistics and supply chain sector—they have a vision for their firms and are looking for additional education to achieve that.” Until this year, the master’s followed a single stream in operational management, but LCL has now established a second track and a chair in digital procurement. “Procurement is becoming a strategic role. You need to decide what you source locally versus globally, should you set up alliances with suppliers and so forth. These are complex questions that you can answer by leveraging data,” he explains.

LCL’s master’s is one of many routes it uses to interact with industry, states Mantin. “It includes an applied thesis, with students working on real-life issues faced by our partners, such as Vodafone, Ferrero, ArcelorMittal, Luxembourg airport, Cargolux and Amazon.” Much of LCL’s advanced research also has real-world applications: for example, it is currently investigating petrochemical inventory issues with BASF and ways to make maritime shipping greener. To broaden and extend its collaborations, LCL has launched a new five-year partnership program, he adds. “I’d like to bring companies further on board and to have greater engagement in larger-scale ambitious research projects.”

“Our one-year master’s follows MIT’s template and attracts students from all over the world.”

Benny Mantin, Director, LCL

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Interdisciplinary connections spark inspiration

Multilingual, international and research-focused, the University of Luxembourg’s Faculty of Law, Economics and Finance has a proactive strategy for excellence

The University of Luxembourg is a state-of-the-art public institution that was founded in 2003 and which is placed 20th in Times Higher Education World Young University Rankings 2021.

Its Faculty of Law, Economics and Finance (FDEF) illustrates its proactive approach to teaching and research excellence. FDEF offers doctoral schools plus bachelor, master, lifelong-learning programs and certificates, the majority of which are independently verified, notably by FIBAA, the globally recognized accreditor of quality in higher education. Those programs are constantly consolidated, enhanced and extended in response to the evolving needs of students at all levels, employers and society. For example, FDEF has recently augmented its Master of Science in Finance and Economics with a digital transformation in finance track and launched a Certificate in Sustainable Finance for professionals.

FDEF’s academic chairs—sustainable finance; entrepreneurship and innovation; space, satellite communication and media law; European and international tax law; digital procurement; and financial law (inclusive finance)—enable it to target its teaching and research on vital areas. However, a key characteristic of FDEF is a focus on interdisciplinarity.



Katalin Ligeti
Dean, FDEF

FDEF at a glance

Number of study programs: 15	Academic staff: 181
Number of students: 2375 + 145 PhD	Official languages: 3
Number of student nationalities: 97	Doctoral schools: 2
External institutional and private partners: 19	Funded chairs: 6

This is possibly best evidenced by its House for Sustainable Governance and Markets, a virtual platform that allows its researchers across all disciplines to work together on a wide range of issues, such as the regulation of sustainable finance, inclusive finance, business and human rights, green supply chains and corporate social responsibility. According to FDEF’s dean, Katalin Ligeti, “In our complex world, economic, societal and political issues are inextricably linked. We’ve harnessed our expertise in multijurisdictional law, economics and finance to contribute toward reaching the United Nation’s sustainable development goals.”

FDEF also benefits from its close proximity to major European Union institutions, as well as Luxembourg’s financial center and business community. It boasts strong networks of partnerships with universities worldwide, the private sector and public bodies, including the country’s government, which it provides with scientific support for high-level policy making. For Ligeti, connections are central to FDEF’s success: “Between disciplines and departments, between ideas, between institutions, between people. Connections spark inspiration, they allow us to see new horizons and expand our ambitions.”

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Proud flag carrier Luxair flying high across Europe

The small airline with big ambitions is a growing player in the European aviation industry and has not been blown off course by the pandemic

As one of the business sectors hit hardest by the COVID-19 pandemic, the aviation industry was buffeted from all sides during the early stages of the global health emergency, but as borders reopened and planes returned to the skies, some semblance of normality returned.

The grounding of its modern fleet for several months in 2020 was certainly not the way award-winning Luxembourg airline Luxair had planned to proudly celebrate its 60th anniversary in 2021. Given its importance to economic activity and employment in the Grand Duchy of Luxembourg and surrounding Greater Region, the rebound in passenger numbers and air freight services has been welcomed by government ministers as well as company officials. The airline offers highly comfortable and competitively priced flights to many of Europe's largest cities, business centers and international hubs for business and leisure passengers.

"For a while, we were completely grounded," explains Luxair CEO, Gilles Feith. "When it came to the relaunch, we had a choice. We could have buried our head in the sand like an ostrich and waited until the storm passed, but that's not how I work. I pushed the envelope to the maximum, flying whatever, whenever and wherever possible. This is an extremely difficult thing to do because you have to be relentless, opening new routes to new destinations. Some work, others do not. We are also subject to the rules and regulations applied not just by the Luxembourg authorities but also all the countries we fly to and connect with."

Unlike large airlines which suspended operations in many countries and continents and reduced headcount by many thousands, Luxair's smaller size gave it a major competitive advantage when air travel resumed as its agility meant it quickly adapted to new business models and launched new routes. Prior to the pandemic, Luxair was running seven rotations a day to London City, four or five to Geneva and a similar number to Vienna, as well as others. "Today, you cannot sustain such a network because the demand is simply not there," states Feith. "My maxim was always fly the maximum (or as much as possible) as we can. We opened new destinations to compensate for the missing rotations."

"Our planes were sitting there needing to fly, so we opened many new routes, to La Rochelle, Toulon, Usedom, Bologna, Dubai, Oslo, Belgrade, Rostock, Krakow and Bucharest. Our strategy was to diversify, doing whatever we could, offering demand and sustaining connectivity on our co-routes."

In keeping with the CEO's ethos of "doing the maximum", Luxair launched services to Dubai in early 2021, with the inaugural flight selling out in less than two hours. "That is when we decided we had to go for it and these routes actually saved us a bit from March to May, because



Luxair connects Luxembourg to Europe's key business centers and beyond

there was a lot of demand," the senior executive continues. "Not only that, but we have a social responsibility for the 3,000 people working directly for Luxair and the 14,000 people in the sector to do the best we can and guarantee operational continuity. These are families who have to pay their mortgages. We cannot downgrade their contracts until this blows over. This is another reason we fly as much as we can. In terms of management, it is significantly more complicated and riskier to open 10 new destinations than to just wait it out, but we do it because we have a social responsibility to our pilots and to all the people working in the sector. All those additional rotations mean more salaries, but we have to be there for everybody."

"We must learn to live with COVID-19, it is the only solution that will allow us to regain a minimum of normality in our daily lives."

Gilles Feith, CEO, Luxair

Despite decimating the aviation industry and other sectors for many months, COVID-19 has brought companies closer together to cope with the unprecedented situation. Feith notes how LuxairCARGO witnessed a great surge in solidarity from other Luxair departments and other companies. Transport firms, the airport authority and the local railway operator all joined forces to handle tons of cargo sourced from overseas. "This was the Luxembourg model in action; people coming together to help solve a dilemma," he adds.

Tailor-made vacations offer premium destinations at reasonable prices

In addition to its flight network, Luxair offers a wide range of package deals and thematic holidays through its tour operating division: LuxairTours. Products are tailored to suit a variety of vacation desires and budgets, always with the mantra of providing the best quality and strictest safety standards. Customers can choose from 85 destinations. Meanwhile, the airline's air freight division handles merchandise of all sizes with ease and efficiency, with its modern operations hub enjoying its status as one of the largest freight distribution centers in Europe.

"The cargo business of today is something we are happy with, but it has a very uncertain future," continues Feith. "Even in 2021, although we made some money in freight, it is still an exceptionally low-margin business. Since it's still not automated, it's labor intensive, which in a high-wage country is always a challenge. The reinvention seen in our airline business needs repeating in the cargo division. We need to analyze, innovate, and see what we can do best in our model and under our constraints. There may be an opportunity in high-value cargo because we have a very efficient process and an extremely secure site. I also see a potential opportunity in pharmaceutical cargoes, which are also on the rise."

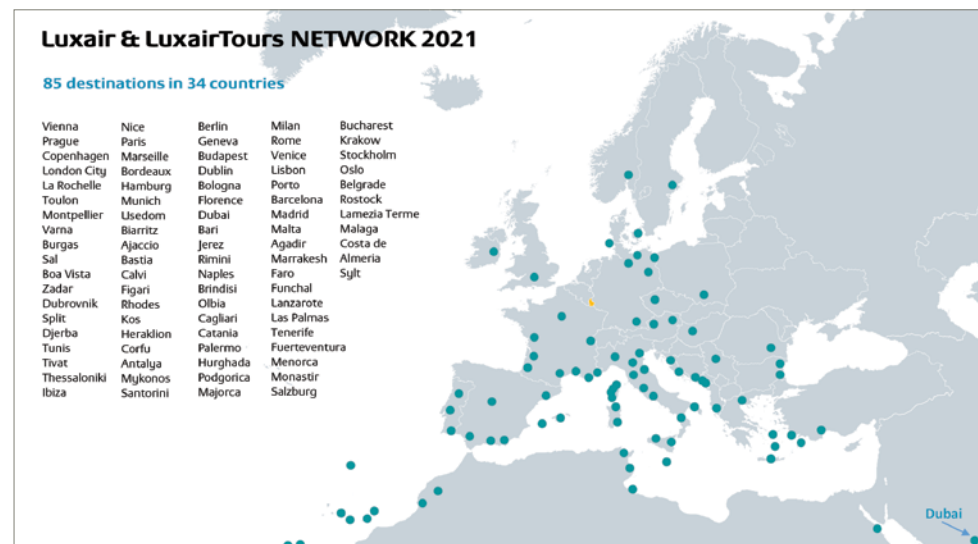
Social and environmental responsibility is a major tenet of Luxair's entrepreneurial vision and the aircraft operator recently pledged its support to a high-profile international drive for net-zero carbon emissions by 2050. This proactive approach to lowering its environmental impact is at the heart of the company's comprehensive sustainability strategy.

"I drive an electric car and pride myself on being environmentally

conscious," Feith says. "No company should do business at the cost of nature. This is the most important part. Aviation cannot be 'greenwashed' of CO₂ use, but we are one sector that fully compensates its emissions, which are getting more and more expensive. We are also thoroughly involved in the research arena, because the environmental friendliness of a plane is linked to more efficiency. If planes are better for the environment, they are also better for the airlines, which have an immensely powerful interest in investing in clean planes. We are planning to have a re-fleeting in 2025-2026 and the planes will be a lot more environmentally friendly. The new fleet will mean we can sustain the business for another 30 years. Aviation needs to be kept sustainable and acceptable for the environment in the long run."

While the dynamic executive accepts some companies could use this as an excuse to take a step back from investing in sustainability, he believes from a regulatory and political point of view, such actions are no longer seen as acceptable.

"There are different means to solve this, and everything should be done so nobody cuts corners on sustainability. Perhaps funding or sector aid should be directly proportional to environmental criteria." Luxair places great emphasis on employees' personal and professional development, with their motivation and wellbeing at work and in-service training being key elements of its human resources management. Facilitating family and personal life is also a key policy, consequently flexible work conditions are made available wherever possible. "Another fun social initiative we are implementing is our internal campaign 'Work as You Are' in which the dress code has been relaxed for our staff," Feith adds. "We are one of the



Luxair's relaxed dress code allows staff to express their true style

first airlines to allow small tattoos, ear piercings, colored nail polish and long hair for men. People should feel happy at work. If we cannot give people a prosperous outlook, you can at least let them feel free to express themselves with their sense of style."

This strong commitment to corporate social responsibility (CSR) extends way beyond the individual appearance of its workforce, with the company gaining plaudits for its approach to employees' welfare during the various stages of the pandemic. Open to alliances and mutually beneficial partnerships, Luxair follows its CEO's mantra of embracing competition, particularly if the competition shares the same social values.

"Competition is not an evil," states Feith. "Competition is necessary because all businesses need to be challenged every so often. However, what is also necessary is a level playing field, but in aviation the playing field is not level. It's tough to compare two airlines flying into Europe if we consider CO₂ regulations and now all the discussions about the taxation of fuels. Any new regulations should be introduced on a level playing field. Competition should not be influenced by outside factors.

"In the travel agency business, we have alliances in the Greater Region. We also had an alliance with Lufthansa in the past and I am entirely open to all kinds of discussions. I will be an active member of our airline associations, whether it is the International Air Transport Association (IATA), European Regions Airline Association (ERA) or other entities, because we have to evolve together. We are open to alliances and looking into it, consolidating as much as possible. With our capacity, we cannot service a high-demand route. We have to fly in a niche and provide excellent connectivity.

"If flying gets any cheaper, it will be at the cost of either the environment or customers. The plane is not a factor; it is the fuel, the people and the CO₂ issue. If flying gets cheaper, it will not be better. This means that we have to see what model will be proposed.

It may be you might not fly five times to one location, but go once or twice. Business travel may mean that instead of five people flying for business purposes, only two or three might travel.

I predict it will not be the number of trips decreasing after 2024, but the people traveling in each group. I forecast at least a 30 percent decrease on the business travel side."

Clear skies ahead as Luxair gears up for investment in brand new fleet

Looking to his company's future, Feith is upbeat about Luxair's prospects, with major investment in a re-fleeting agreement on the horizon, a development Feith believes will reinforce shareholders' and investors' confidence in the business.

"If I sign a re-fleeting agreement—which should not be misinterpreted as the desire to sign some big contract—it means my shareholders, banks and the financial sector believe in our future as a company," he says. "In business, the strongest thing you can get in outside validation is that 'Yes'; we believe in buying an asset which will last us 30 years."

Hefty investment has also been seen in 2020, with LuxairTours launching an integrated dynamic production as a new strategy. Rather than just the usual selection of hotels, customers were offered the choice of apartments, villas and boutique hotels due to the big shift in accommodation demand triggered by the pandemic. "This is an innovative IT development, which we are still populating," Feith reveals. "I want to have at least 500 hotels by 2022. We have properties now which we could not service before because we could not take 200 people there in one go. People also want something different because of COVID-19. They want a nice apartment to stay with their families in a controlled environment. We took the time to do this carefully and reinvent our business model a bit on that side too."

"A fun social initiative we are implementing is our internal campaign 'Work as You Are' in which the dress code has been relaxed for our staff."

Gilles Feith, CEO, Luxair

Expanding on this point, he continues: "Toulon, one of our new destinations, is a small airport remarkably close to Saint-Tropez. We also fly to Nice, Montpellier and Marseille. Then I thought that we also have to give our customers a choice. Our innovation was to allow them to purchase multi-city tickets online.

You will be able to fly from Luxembourg to Toulon and then return from Nice to Luxembourg. You should be able to purchase it easily and you will not be penalized for changing airports and cities. People can customize their own travel plans. "Some people may want to fly from Biarritz, which is a pleasant location, to La Rochelle, and then rent a car. Perhaps you take a delightful holiday from Bari to Napoli, or from Rome to Napoli, and the best part is that the prices are reasonable.

We have had to get broader in our innovations. This was an IT development we undertook during the lockdown, tackling the challenge of fulfilling people's desires to be more individual and more in control. It makes total sense that we adapt to their needs."

Calm CEO pilots clear path above fiscal turbulence

Given his airline's importance to national economic wellbeing, Gilles Feith is eager to ensure Luxair emerges from the pandemic in strong shape, as he explains



Luxair provides passengers with a range of flexible travel options

How has the COVID-19 pandemic affected the different segments at Luxair and how have you adapted your operations across the group?

I would venture to say that no sector has been hit by the COVID-19 crisis as hard as the travel sector. The task at hand is to learn to live with the situation and gain experience to tackle similar situations in the future. I knew we had to first work on people's psychological state and general mood, which had been so heavily infected.

In 2020, we launched an art plane with SUMO!, a Luxembourgish artist. This plane is plastered with colorful, positive messages saying, "Relax", "Up and Away", "Live Life Like it's the Weekend". This was not done as a publicity stunt; we just wanted to elevate people's moods. The artist was given free rein to run his own communication campaign and he also did

"We launched an art plane [...] plastered with colorful, positive messages saying, 'Relax', 'Up and Away', 'Live Life Like it's the Weekend'."
Gilles Feith, CEO, Luxair

it for free. He was given a percentage of the merchandizing, but he did it as a gesture to encourage people and break out of the psychological circle lockdown and isolation had created in everyone.

That is the most important takeaway also from the COVID-19 crisis. We have to keep going and keep pushing out of this. If I had to summarize the COVID-19 situation in aviation in one word, it would be "perseverance". We need to persevere. Everybody in June 2020 in our industry and in many other industries thought we would push through quickly and the situation would be over, but it was not. It is a continuous push and it will continue.

Luxair's corporate social responsibility initiatives and employee empowerment have received many plaudits, such positive feedback must be highly satisfying to see?

On our website's "About Us" page, you will find our annual report which comprises the people who make up Luxair, showing that we are still a social company and that we are still here. Although there is nothing good we can say about the numbers, we still have a story to tell about who we are and what we do internally.

This year's annual report's penultimate page may be the most important one. It shows it was done internally. We had no ad agency or external media working on it. It was our cabin crews who made the videos and photography. We have done collaborations with local designers, a lot of TikTok and many other creative projects.

What would you say to any brands or businesses that are considering investing or setting up operations in Luxembourg?

I'm a native Luxembourgish guy, born and raised here, so feel qualified to speak on this. What I love about Luxembourg is it's genuinely unique aspect in that we have very tried-and-true ways. There are problems like in any other country, but the difference in Luxembourg is they will be solved quickly. Here you know everyone, and you know what needs to be done and how to get it done. People are pragmatic and speak so many languages. Luxembourg offers quick solutions, which is a driving factor for business.

The success of the Luxembourg model, which has been proven, is something you have to see for yourself. It is simply easy to do business here. I am highly active with many friends in the expatriate community and Luxembourg is really a joyful land for newcomers. We have a strong community vibe and a lot of things to do. It's a wonderful place to visit and settle down.

Social and environmental commitments at the heart of the airline

- The average age of Luxair's aircraft is just **6.5 years**
- In **2025-2026**, a re-fleeting will cut aircraft emissions
- Luxair's cargo handling division achieved an impressive **33%** reduction in energy use
- Financial support to social grocery stores allows access to **250** discounted products

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